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ABSTRACT

This manual provides information needed to meet specific standards for certification as a pesticide applicator. The text discusses important right-of-way weeds and unwanted woody plants and provides suggestions for both long- and short-term control. Attention is also given to special problems associated with application of right-of-way herbicides. These include drift, lateral movement, contamination of nontarget areas, and accidental spillage. (CS)

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Iowa
Commercial Pesticide Applicator Manual

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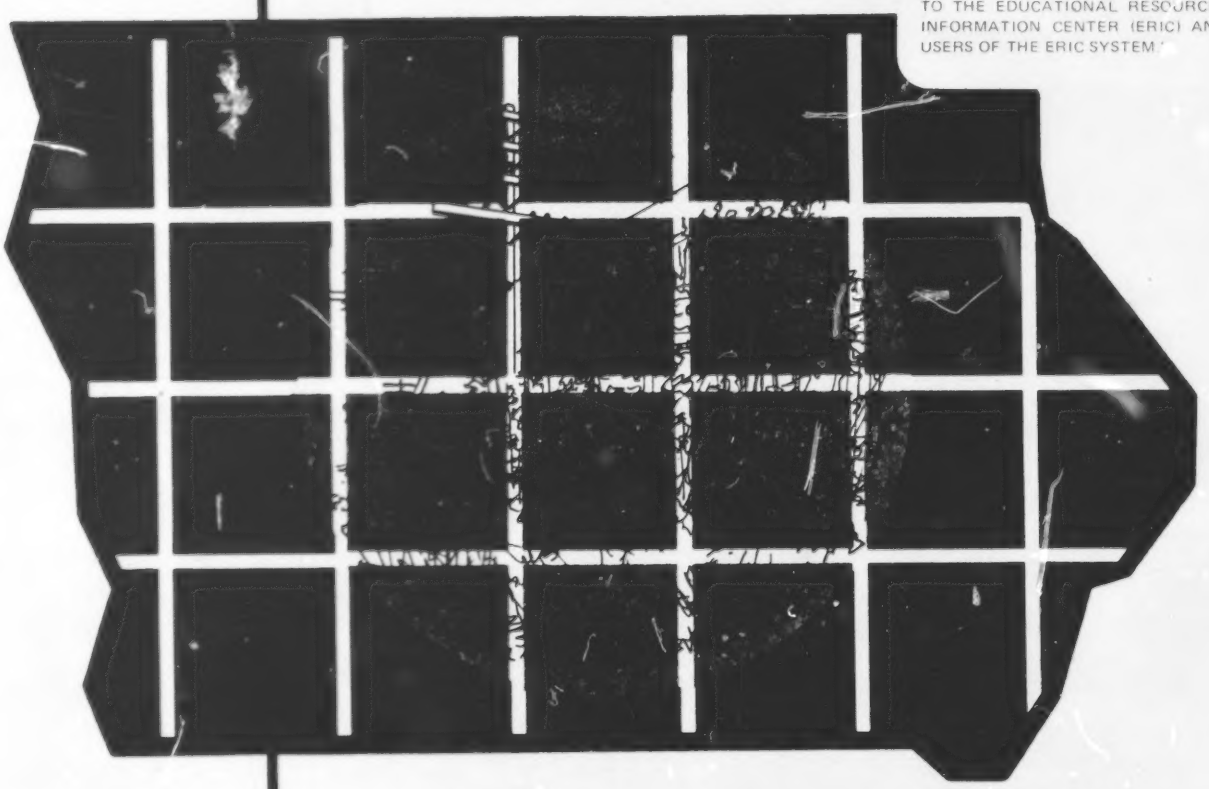
CATEGORY 6

RIGHT-OF-WAY PEST CONTROL



This manual is to be used for certification training in conjunction with the U. S. Department of Agriculture – U. S. Environmental Protection Agency manual, **Apply Pesticides Correctly,** EPA-335.

Cooperative Extension Service
IOWA STATE UNIVERSITY
Ames, Iowa 50011

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This manual has been developed for individuals wishing to become certified in commercial pesticide applicator category 6, Right-Of-Way Pest Control. It contains specific information that an individual must know before becoming certified in Category 6. The manual has been designed to supplement the general information contained in the core manual Apply Pesticides Correctly - A Guide for Commercial Applicators (plus an Iowa State University supplement) and should not be used for certification preparation without referring to the core manual as well.

Prepared by Vivan M. Jennings, extension weed specialist, and Stephan O. Ryan, former pesticide training coordinator, who express appreciation to the University of Georgia for use of source material.

CONTENTS

Introduction	1
Control of Broadleaf Weeds on Roadsides and Noncropland Areas	2
Spot Treatment of Difficult to Control Weeds on Roadsides and Noncropland Areas	3
Long-term Vegetation Control - Soil Sterilization	4
Short-term Vegetation Control	5
Weed Response to Selected Herbicides	6
Control of Unwanted Woody Plants	8
Stem Foliage Treatments	9
Basal Bark Treatments	10
Stump Treatments	11
Woody Plant Response to Selected Herbicides	12
Special Things to Consider When Applying Right-of-Way Herbicides	13
Drift	13
Drift Control Agents	14
Lateral Movement	15
Contamination of Nontarget Areas	15
Accidental Spillage of Right-of-Way Herbicides and Application at Excessive Rates	17
If Noticed Immediately	17
If Noticed After a Rain	17
Suggested References	19

INTRODUCTION

It is often desirable to control vegetation in waste areas, parking lots, driveways, around buildings, along roadside ditches and in other right-of-way areas. To accomplish this, various forms of vegetation control may be desired. This may include control of perennial weeds and brush. On a long-term basis, soil sterilization to prevent vegetation growth for greater than a year's time may be desirable around road signs, parking lots and other similar areas. In areas where trees and brush have previously been cut, it may be desirable to prevent regrowth from stumps and further growth of brush in the area.

Both weed and brush management are of increasing interest to individuals in charge of maintaining conservation parks, right-of-way areas, and similar locations. There are various reasons to control weeds and brush, although in some locations, it will destroy the natural habitat for wildlife. Reasons for controlling undesirable vegetation include that of providing road users a better view of vehicles, animals and persons that might be using, or near, the road. The lower growing grasses may provide less of a fire hazard than larger vegetation that might burn more easily under dry conditions, and there is also something to be said for a well maintained appearance of property and roadsides as well. Some weedy species (noxious weeds) become increasingly unmanageable if left uncontrolled and thus need constant cultural or chemical control measures.

The following is a summation of the important right-of-way weeds and unwanted woody plants in Iowa. For a description of the weed species as an aid in identification, refer to WEEDS OF NORTH CENTRAL STATES (North Central Publication #26).

CONTROL OF BROADLEAF WEEDS ON

ROADSIDES AND NONCROPLAND AREAS

Weeds	Herbicide and Formulation Available	Remarks
2,4-D susceptible broadleaf weeds	2,4-D amine or low volatile ester 4 and 6 lb. a.e.	Apply 2,4-D or mixtures of 2,4-D and 2,4,5-T or Silvex to control susceptible species in early summer when most weeds are 4-6 inches tall and actively growing
Many biennial and perennial broadleaf weeds	2,4,5-T or 2,4,5-TP (Silvex) amine of low volatile ester 4 lb. a.e.	Apply in combination as above in 1:1 ratio on actively growing weeds with fully expanded leaves.

SPOT TREATMENT OF DIFFICULT TO CONTROL

WEEDS ON ROADSIDES AND NONCROPLAND AREAS

Weeds	Herbicide and Formulation Available	Remarks
Milkweed Canada thistle Perennial sowthistle Quackgrass Cattail	Amino triazole weed killer 90 (Amitrole) 90% S.P.	Apply before flowering as a spot treatment. Spray to wet foliage. May sterilize the soil for 1 year.
Poison ivy Poison oak	Amino triazole weed killer 90 (Amitrole) 90% S.P.	Apply after leaves are fully expanded and thoroughly wet foliage. No vapor drift. DO NOT use near desirable shrubs and trees.
	Ammate X (ammonium sulfate) 95% crystals	Apply after leaves are fully expanded and thoroughly wet foliage. Corrosive to metals. No vapor drift. DO NOT use near desirable shrubs and trees.
	2,4,5-T or 2,4,5-TP (Silvex) 4 lb. a.e.	Apply after leaves are fully expanded and thoroughly wet foliage. Vapors may drift to susceptible plants. Apply with caution around desirable shrubs and trees.

LONG-TERM VEGETATION CONTROL - SOIL STERILIZATION

In some areas, it may be desirable to maintain certain areas free of vegetation (soil sterilization) for some period of time. It is usually desirable first to destroy existing vegetation, since many of the applied materials may not effectively penetrate the soil to the depth where they can affect the underground root system and kill established plants. The effect desired is that of maintaining a bare area by not allowing weed emergence.

Weeds	Herbicides and Formulations Available	Remarks
Most annual, biennial and perennial weeds	Ammate X (amonium sulfate) 95% crystals	Apply to soil or wet all foliage. Will need repeated treatments for sterilization. May be used for vegetation control in sidewalks, cracks, etc.
	AAtrex or atrazine 80W or 8G	Apply before or at time of weed emergence. Water movement may move chemical from point of application. DO NOT use around useful trees or ornamentals.
	Hyvar X (bromacil) 80% W.P.	Apply uniformly as a spray. Avoid drift to crops or ornamentals. DO NOT apply near trees or ornamentals.
	Pramitol (prometone) 25E and 5PS	Apply as a spray to soil or foliage during or shortly after weed emergence.
	Princep (simazine) 80% W.P.	Apply as a spray to soil before weed emergence. Adsorbs to the soil and moves very little in the soil.
	Roundup (glyphosate) 3 lb a.e.	Effectively controls most emerged annual, biennial and perennial weeds with no residual or soil sterilization. Will have no affect on later germinating and emerging seedlings.

SHORT-TERM VEGETATION CONTROL

Weeds	Herbicides and Formulations Available	Remarks
Annuals, biennials and perennials	Paraquat (paraquat) 2 C.L.	Use protective measures to avoid inhalation of fumes when applying. Paraquat will provide a quick burn down of vegetation with no residual. Annual species may be controlled.
	Roundup (glyphosate) 3 lb a.e.	Effectively controls most emerged annual, biennial and perennial weeds with no residue.

*WEED RESPONSE TO SELECTED HERBICIDES

E=Excellent G=Good F=Fair P=Poor N=None

Weed	2,4-D	2,4,5-T	Silvex 2,4,5-TP
ANNUALS:			
Buckwheat, wild	F	G	F
Catchfly, night flowering	N	N	N
Chickweed, common	P	G	E
Cocklebur	E	E	E
Knotweed	F	F	F
Lambsquarter	E	E	E
Lettuce, prickly	E	E	E
Mustard	E	E	G
Pigweed	E	E	E
Purslane	F	F	G
Ragweed	E	E	E
Smartweed	G	G	F
Sow thistle	E	E	E
Velvetleaf	E	G	G
Violet	P	G	G
WINTER ANNUALS:			
Cinquefoil	G	F	F
Fleabane, daisy	F	F	F
Medic, black	F	F	G
Pepperweed	E	G	F
Pennycress	E	E	G
Sheperds purse	G	E	G
BIENNIALS:			
Burdock	E	E	E
Carrot, wild	F	F	F
Evening primrose	E	G	F

*This material is included for your information only; it is not required for certification.

WEED RESPONSE TO SELECTED HERBICIDES (cont)

Weed	2,4-D	2,4,5-T	Silvex 2,4,5-TP
BIENNIALS (cont)			
Goats beard	G	F	F
Mullein	P	F	F
Parsnip, wild	E	E	E
Rocket, yellow	G	G	F
Teasel	G	G	G
Thistle, bull	E	E	E
Thistle, musk	E	E	E
PERENNIALS:			
Aster	G	G	G
Bedstraw	P	P	G
Bindweed, field	F	F	F
Buttercup	G	E	E
Chickweed, mouse eared	G	G	G
Chickory	G	G	G
Cockle, white	P	N	N
Dandelion	E	E	E
Dock	G	G	P
Goldenrod	F	G	F
Ground ivy (creeping Charlie)	F	F	G
Heal-all	G	G	P
Hemp dogbane	P	N	N
Horse nettle	P	F	F
Horsetail	P	P	P
Milkweed	N	P	P
Plantain	E	E	E
Sorrel, sheep	G	F	F
Spurges, leafy and cypress	P	P	F
Thistle, Canada	F	F	F

NOTE: Species with "G" or "F" ratings often need repeat applications for control.

CONTROL OF UNWANTED WOODY PLANTS

Small areas of brush in waste lots, ravines, and in odd corners in fields or around farm ponds serve a useful purpose as cover for birds and other forms of wildlife. It is desirable on every farm to reserve an acre or two for plantings in order to encourage habitation by birds and other forms of wildlife. Such plantings also can be of unmeasurable value and pleasure to individuals in providing them with wild blackberries, hazelnuts, and dewberries. The use of such plantings should be encouraged. There is room on every farm for small areas of well-controlled brushland. Such areas should be relatively close to farmsteads, if possible, and bordered by clean, cultured crops so as to eliminate danger of spread to other areas.

However, there are thousands of acres in Iowa infested with brush of various descriptions which contribute very little to the economic well-being of anyone. There is no single answer for the reclamation of these brush-infested areas. The type of brush involved, the slope of the land, the existing grass undercover, the density and size of the brush involved, the financial resources at the disposal of the operator who seeks to reclaim such land--these and many more variables influence the choice of the method to be used for brush control. The operator must make the decision as to what method or program of control is best suited under his own particular situation. Most brushy plants are quite aggressive in invading new areas and, for that reason. good programs of "containment" or control are important to limit the brush only to the areas where it can be useful or tolerated.

STEM FOLIAGE TREATMENTS

Woody Plant	Herbicide and Formulation Available	Remarks
Woody plants susceptible on Page 12	2,4-D amine or low volatile ester, 4 or 6 lb. a.e.	Apply with a hand gun when susceptible species have fully expanded leaves in the spring and fully cover foliage. Plants should be less than 10 ft. tall.
	2,4,5-T or Silvex	Same as above. 2,4-D and 2,4,5-T may be used in a 1:1 ratio also for broader spectrum of control. Use Silvex for oak and maple spp. Plants should be less than 10 ft. tall.
Also use on cedar and other evergreens or conifers	Ammate (ammonium sulfamate) 95% crystal	Apply using 100 to 200 gal. of water per acre. Spray all foliage until runoff. Vapor drift not a problem. May be corrosive to sprayer parts. Plants should be less than 10 ft. tall.

BASAL BARK TREATMENTS

On small brush, it may be desirable to use a basal treatment of a mixture of 2,4-D plus 2,4,5-T and fuel oil preferably applied in early spring to the lower 12 inches of the above-ground portions of the brush. The application can be made with a knapsack-type sprayer or with other more mechanized equipment.

The bark must be dry at the time of treatment to be effective. Spray completely around the base of the tree. It is also effective on such plants as wild currants, dogwood, gooseberries, small clumps of hazel brush or buckbrush. Spray the crowns thoroughly to runoff. Basal treatment will kill large or small brush. If the brush is to be removed from the land, it should be removed first and the stumps treated. Dead brush is hard to cut.

Basal treatment is primarily of value where the brush is relatively large and scattered. For small, densely growing brush, foliage applications are preferred. An added advantage of foliage sprays is that annual weeds, such as ragweed, are also controlled. Basal spraying of large brush and trees leaves a lot of dead, unsightly material. This is undesirable in fence rows, along highways, or under utility lines. Trees only 4 inches in diameter have been known to stand for as long as 4 years in the dead condition. This creates an undesirable "eyesore" for a long period of time. While hand removal is laborious and expensive, the user will generally be much better satisfied to cut the trees and brush first, then spray the stumps to runoff using 1 quart of "brush killer" to 5 gallons of fuel oil, or the regrowth can be sprayed in the foliage stage.

Woody Plant	Herbicide and Formulation Available	Remarks
Most all woody species	2,4-D plus 2,4,5-T low volatile ester 1:1 mixture	Apply to trees less than 4 inches in diameter to upper 12 inches of trunk and exposed roots in late winter or early spring on oak and hickory. Apply anytime for most other species.

STUMP TREATMENTS

In certain situations, it may be desirable to remove existing brush by hand rather than killing it by spraying and leaving the dead material standing. In this situation, however, it may be desirable to treat the stumps to prevent regrowth from the previously cut material. Therefore, it is desirable to treat with either AMMATE (either sprayed or as a dry application) or with 2,4-D and/or 2,4,5-T with fuel oil (preferably as a spray or paint-on application) on all freshly exposed wood that may regrow. Application may be done at any time of the year, but preferably as soon as possible after cutting the trees or brush.

Woody Plant	Herbicide and Formulation Available	Remarks
Most all woody species	Ammate X (ammonium sulfate) 95% crystals	Apply to freshly cut stumps until moist and wet to ground line in spring or early summer. Crystals may be applied to frills or holes bored in stumps.
	2,4-D or 2,4,5-T or mixture of low volatile ester	Apply as a spray or mixture on stump in spring or early summer for most effective control.

*WOODY PLANT RESPONSE TO SELECTED HERBICIDES

E=Excellent G=Good F=Fair P=Poor N=None

Woody Plant	(Ammate) Ammonium Sulfamate	2,4-D	2,4,5-T	Silvex 2,4,5-TP
Ash	---	P	F	F
Blackberry	G	P	G	F
Boxelder	G	G	G	G
Buckbrush	---	G	F	N
Cedar, red	G	N	N	N
Cherry, choke	E	P	F	F
Gooseberry	---	E	G	---
Greenbriar (smilax)	---	N	P	P
Hawthorn	F	N	F	P
Hickory	G	P	F	F
Locust, black	F	F	G	G
Maple	G	P	F	G
Mulberry	---	N	P	F
Oak spp.	E	P-F	F-G	G
Osage orange (hedge)	---	P	G	F
Poison ivy	E	F	E	E
Poison oak	E	F	E	E
Rose, multiflora	---	P	F	F
Sumac	E	E	E	E
Willow	E	G	G	G

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SPECIAL THINGS TO CONSIDER
WHEN APPLYING RIGHT-OF-WAY HERBICIDES

Changes in registrations of old herbicide products or new product registrations may occur before each use season. Carefully read the label before using any herbicide.

Proper application is an absolute requirement in obtaining satisfactory results from any herbicide treatment. All treatments must be applied uniformly at the recommended rate over the area to be treated. Foliage applied treatments (contact and translocated) must be applied with a sufficient volume of carrier (usually water) to assure adequate coverage.

It is essential to review the label for special environmental and safety hazards due to the wide variety of areas rights-of-way traverse. A principal concern in use of chemicals in all rights-of-way is containment of the treatment within the right-of-way. In all cases, steps must be taken to avoid or minimize the impact of right-of-way herbicide treatments on nontarget areas near the right-of-way. Basically, this can be accomplished by preventing or reducing drift to an absolute minimum, because drift is probably the chief culprit contributing to the contamination of nontarget areas.

Drift: The term "drift" refers to the movement of herbicides through the air to areas not intended for treatment from areas of intended treatment. Drift is a problem of major concern in right-of-way maintenance. It presents a potential hazard to sensitive vegetation (crops, gardens, ornamentals), wildlife, people, livestock and aquatic areas adjacent to rights-of-way. Drift occurs by two means:

(1) Particle drift - At the time of application, small spray droplets can be carried by air movement from the application area to other areas.

To reduce the danger of particle drift damage:

- use nozzles that apply a coarse spray
- use low pressures
- avoid spraying on windy days when drift could occur
- spray when air movement is away from susceptible crops or ornamentals
- if drift is a hazard and spraying is necessary, use special drift control agents or formulations in properly designed and adjusted equipment.

Particles of fog or mist size present the greatest drift hazard. These size particles are often generated by high volume spraying equipment utilizing high pressures for foliage treatment of trees and brush.

(2) Vaporization - This results from the tendency of chemicals to vaporize or give off fumes. The movement of such fumes with wind currents may cause injury to sensitive vegetation a mile or more from the point of application.

Ester formulations of the phenoxy-type herbicides (2,4-D, 2,4,5-T, 2,4,5-TP, etc.) present the greatest potential for vaporization. Amine formulations of these herbicides are essentially nonvolatile, however, and do not present a drift hazard.

Drift Control Agents[1]: Adjuvants and application systems have been developed which help overcome certain inherent drift problems that exist in conventional spraying. Three of these systems are:

(1) Foams
(2) Invert emulsions
(3) Spray additive stabilizers

Though different in method, all three systems offer similar advantages in better drift control and more highly visible spray (better placement).

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[1]This section adapted from E. I. DuPont DeNemours & Co., Inc. Manual A-86439 "Weed and Brush Control-Technical Manual for Professionals". pp. 6-7.

Lateral Movement: Caution must be exercised in use of herbicides (particularly bare ground treatments) on slopes, sandy soils and in areas that may be subject to erosion in heavy rains. All soil-active herbicides can move laterally. Such movement may cause excessive destruction of vegetation and result in soil erosion or cause injury to desirable vegetation.

In areas where complete vegetation destruction may result from bare ground treatments, contact, foliage translocated or selective herbicides should be used for vegetation abatement. Vegetation abatement entails knockdown of established vegetation and/or short-term residual vegetation control.

Contamination of Nontarget Areas: Special care should be exercised not to contaminate nontarget areas when applying right-of-way herbicides. The following is a list of nontarget areas to be especially careful around:

(1) Aquatic areas - When treating areas adjacent to aquatic sites, use herbicides that are labeled for that purpose. Use care to avoid drift and vaporization and keep spray out of the water. Be alert to possible lateral movement or runoff from the treated area into the aquatic site.

(2) Desirable vegetation areas (gardens, crops, ornamentals, etc.) - Do not apply herbicides to areas where roots of desirable plants may absorb the chemical. Desirable plants located off the right-of-way often have a considerable portion of their root systems located within the right-of-way.

(3) Sloping areas - Sloping areas stripped of vegetation by use of herbicides will erode. In such areas, maintain a cover or mulch by occasionally skipping retreatment or through use of selective herbicides.

(4) People and domestic animal areas - The best guide is to handle all herbicides with care. Avoid splash or spray contact, and keep exposure to

a minimum. Never keep herbicides in containers that are improperly labeled, nor easily accessible to children. Never dump unused herbicides where water supplies may be contaminated. Be sure to avoid direct contact of spray particles or herbicides with the applicator or persons and domestic animals in or nearby the treatment area.

Certain herbicides are corrosive. In application of herbicides, avoid spray contact with automobiles, buildings and various other metal surfaces to avoid potential corrosion.

(5) Livestock areas - Herbicides sprayed on plants are generally not toxic to livestock, but there are exceptions (sodium arsenite, for example). However, livestock may be poisoned by eating unused herbicides left in open containers or by drinking water contaminated with herbicides.

Certain unpalatable or poisonous plants treated with herbicides may become more palatable to livestock. Be certain that livestock cannot get to poisonous plants which have been sprayed with herbicides.

ACCIDENTAL SPILLAGE OF RIGHT-OF-WAY HERBICIDES AND APPLICATION AT EXCESSIVE RATES[2]

Most bare ground herbicides may seriously damage or kill valuable trees and should not be applied to their root systems or to areas where water from treated areas may wash into the root systems of valuable plants. Should material be accidentally spilled or applied, then the following is suggested:

If Noticed Immediately: Remove about 1 inch of treated soil with a shovel or flat spade and dispose of in areas where bare ground is desired. This should remove most of the herbicide. The trees should then be inspected periodically to determine whether any chlorosis develops. If in doubt as to complete removal, or as an extra-precautionary measure, 7 pounds of activated charcoal per 1,000 sq. ft. should be spread evenly, then incorporated lightly with a roto-tiller.

If Noticed After a Rain: If some time has elapsed and some rain has been received, the soil should be removed to a depth of 4-6 inches, then charcoal broadcasted over the area and incorporated.

These residual herbicides are usually absorbed by clay and organic matter particles in the soil and disappear at the rate of about 80% per year. If a misapplication is noticed immediately, then most of the damage can be prevented by simply removing the upper layer of soil. However, the longer that time elapses following the application, the greater depth the chemical will penetrate into the soil and the more difficult it is to mechanically remove it with the soil. In some instances, root pruning has been effective in isolating the herbicide away from the root system, particularly when only a portion of the root system is involved.

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[2] This section adapted from E. I. DuPont DeNemours & Co., Inc. Manual A-86439 "Weed and Brush Control-Technical Manual for Professionals," pp. 28.

Activated charcoal absorbs the herbicide from the soil (ties it up) and makes it unavailable to plants. By reducing the availability of the herbicide to plants, injury is minimized.

SUGGESTED REFERENCES

Weeds of North Central States (NC Publication #26)

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